Quantum Mechanics

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Quantum Mechanics (Wikipedia)

Schroedinger Equation (Wikipedia)

Postulates:

1. Every positive number (integer) is prime (invariant) relative to itself (its own base): $n = n\left(\frac{n}{n}\right) = n\left(1_n\right) \leftrightarrow 1 = 1\left(\frac{1}{1}\right) = 1_1$; every prime number is odd. Note that if no base is specified, the unit 1 is interpreted to apply to all numbers : $n \times 1 = n = n(1_n)$.
2. Every even number is the sum of two primes (Goldbach's Conjecture): $n + n = 2n$
3. There are no negative numbers:
   $-c = a + b$
   $b > a \leftrightarrow b - c = a > 0$
   $a - a = 0,\ a + a = 2a$
   Note that if there are no negative numbers, then there are no square roots of negative numbers.
   If $i := \sqrt{-1} \leftrightarrow i^2 = -1 \leftrightarrow i^4 = 1 > 0 \leftrightarrow \sqrt[4]{(1)^4} = \sqrt[4]{(i)^4} = 1$
4. Proof of Fermat's Last Theorem
   Hypothesis: $\forall\{a, b, c, n \geq 2\} : c^n \neq a^n + b^n$
   Thesis (Proof):
   $c = a + b$
   $c^n = (a+b)^n = \left[a^n + b^n\right] + \left[f(a,b,n)\right]$ (Binomial Expansion)
   $c^n = \left[a^n + b^n\right] \leftrightarrow \left[f(a,b,n)\right] = 0$
   $\left[f(a,b,n)\right] \neq 0$
   $c^n \neq \left[a^n + b^n\right]$
   Q.E.D.

5. In order to multiply ($a \times b \equiv ab$) two prime elements, they must first exist

   $\# := c = a + b$

   $\#^2 := c^2 = (a+b)^2 = \left[a^2 + b^2\right] + \left[2ab\right]$

   Note that if a is even and b is odd, then both $\#$ and $\#^2$ are odd (and thus prime number invariants), If b is even, then $\#$ is even, since it is the sum of two primes (even if different)
6. (Russell's Paradox)

   "A barber in a village shaves all those and only those that don't shave themselves. Does the barber shave himself?" – Bertrand Russell

   Ans. Such a barber cannot exist; a barber cannot both shave and not shave himself.

   Mathematically, a number cannot both multiply and not multiply itself: $1^2 \neq 1$

   $\# = 1 + 1$

   $\#^2 = (1+1)^2 = \left[(1)^2 + (1)^2\right] + \left[2(1)^2\right]$

   $1^2 \neq 1$
7. Division by Zero

   Division by zero ($\frac{n}{0} = n$) does not affect the numerator, since the numerator is divided by "nothing"; the division operator has no effect on the value of the numerator.
8. Transition

   $n_{(\uparrow)} \to n + n(\theta) \to n + k,\ k \geq n$

   $n_{(\downarrow)} \to n - n(\theta) \to n - k,\ k < n$

   Initial State

   $$f_0 := f_0\left(\frac{f_0}{f_0}\right) = (ct)_0 \frac{(ct)_0}{(ct)_0} = (ct)_0 \left(1_{(ct)_0}\right)$$

   $$f_0 = \frac{f_0}{2} + \frac{f_0}{2}$$

   $$m_0 := \left|(f_0)^2\right| = \left|\frac{f_0}{2} + \frac{f_0}{2}\right|^2,\ m_0 := m_0\left(\frac{m_0}{m_0}\right)$$

   $$m_0 = m_0 \cos(0)$$

   $$\cos(0) = \frac{\cos(0)}{2} + \frac{\cos(\pi)}{2} = \frac{1}{2} + \frac{1}{2} = 1$$

   Initial State

   $$\theta = 0 \leftrightarrow \sin\theta = 0$$

   $$\varphi = m_0 \cos(0) = m_0 \cos(\pi) = m_0(1)$$

   $$\varphi^2 = (m_0)^2 (1)^2$$

Transition State

$$\left|-\sin\theta\right| = \sin\left(\left|-\theta\right|\right) \leftrightarrow \left|\sin\theta\right| \geq 0$$

$$\varphi = m_0\cos\left(0\right) + m_0\sin\theta$$

$$\varphi^2 = \left(m_0\cos\left(0\right) + m_0\sin\theta\right)^2 = \left(m_0\right)^2\left[\cos(0) + \sin\theta\right]^2$$

$$= \left(m_0\right)^2\left[\left(1\right) + \sin\theta\right)^2\right]$$

$$= \left(m_0\right)^2\left[\left(1\right)^2 + \sin\theta\right)^2\right] + \left[2\left(1\right)\sin\theta\right]$$

$$= \left(m_0\right)^2\left\{Tr\begin{vmatrix}(1+\sin\theta) & 0 \\ 0 & 1+\sin\theta\end{vmatrix} + Det\begin{vmatrix}\left(1\right)\sin\theta & \left(1\right)\sin\theta \\ -\left(1\right)\sin\theta & \left(1\right)\sin\theta\end{vmatrix}\right\}$$

$$= \left(m_0\right)^2\left\{Tr\begin{vmatrix}(\cos 0+\sin\theta) & 0 \\ 0 & \cos\pi+\sin\theta\end{vmatrix} + Det\begin{vmatrix}\cos 0\sin\theta & \cos 0\sin\theta \\ \cos 0\sin-\theta & \cos\pi\sin\theta\end{vmatrix}\right\},\ \sin-\theta = -\sin\theta$$

Quantum Mechanics

$$h^2 = \left[2\left(1\right)\sin\theta\right]$$

$$\pi\varphi^2 = \left(m_0\right)^2\left[\pi\left(1\right)^2 + \pi\sin\theta\right)^2\right] + \left[\left(1\right)\left(2\pi\sin\theta\right)\right]$$

$$= \left(m_0\right)^2\left[\pi\left(1\right)^2 + \pi\sin\theta\right)^2\right] + h^2,\ h = \sqrt{2\pi\sin\theta} = \sqrt{\pi}S^2,\ S := \sqrt{2\sin\theta}$$

Note that:

$$\theta = 0 \leftrightarrow S = h = 0$$

$$\theta = \frac{\pi}{4}, \frac{3\pi}{4}$$

$$\left(\pi h\right)^2 = \pi\left[\left(1\right)\left(\sin\frac{\pi}{4}\right)\right]\left[\left(1\right)\left(\sin\frac{3\pi}{4}\right)\right] = 2\pi(1)^2$$

$$\hbar := \frac{h}{2\pi}$$

$$\left(\pi\hbar\right)^2 = \hbar\left[\left(1\right)\left(\sin\frac{\pi}{4}\right)\right]\left[\left(1\right)\left(\sin\frac{3\pi}{4}\right)\right] = \hbar(1)^2$$

Final State

$$\theta = \frac{\pi}{4}, \frac{3\pi}{4}$$

$$\varphi = m_0 \cos(0) + m_0 \sin\left(\frac{\pi}{4}\right) = m_0(1+1) = 2m_0$$

$$\varphi^2 = (m_0)^2 \left\{ Tr \begin{vmatrix} \left(1+\sin\frac{\pi}{4}\right)^2 & 0 \\ 0 & \left(1+\sin\frac{3\pi}{4}\right)^2 \end{vmatrix} + Det \begin{vmatrix} (1)\sin\frac{\pi}{4} & (1)\sin\frac{\pi}{4} \\ -(1)\sin\frac{3\pi}{4} & (1)\sin\frac{3\pi}{4} \end{vmatrix} \right\}$$

$$= (2^2 + 2^2) + (1)^2 \left[\left(\sin\frac{\pi}{4}\right)\left(\sin\frac{3\pi}{4}\right) - \left(\sin\frac{\pi}{4}\right)\left(\sin\frac{3\pi}{4}\right)\right]$$

$$= 4(1^2)$$

$$\varphi := Tr\begin{vmatrix} 1 & 0 \\ 0 & 1 \end{vmatrix} = 1+1$$

$$\varphi^2 = Tr\begin{vmatrix} 1^2 & 0 \\ 0 & 1^2 \end{vmatrix} + Det\begin{vmatrix} 1 & 1 \\ -1 & 1 \end{vmatrix} = \left[1^2 + 1^2\right] + 2(1^2) = 4(1^2)$$

$$= Tr\begin{vmatrix} 1^2 & 0 & 0 & 0 \\ 0 & 1^2 & 0 & 0 \\ 0 & 0 & 1^2 & 0 \\ 0 & 0 & 0 & 1^2 \end{vmatrix}$$

9. Density

$$ct' = ct + vt'$$

$$(ct')^2 = \left[(ct)^2 + (vt')^2\right] + \left[2(ct)(vt')\right]$$

$$\gamma := \frac{t'}{t},\ \beta := \frac{v}{c}$$

$$(ct) = (ct)\left(\frac{ct}{ct}\right) = (ct)(1_{ct})$$

$$vt' \geq ct$$

$$\gamma^2 = \left[(1_{ct})^2 + (\gamma\beta)^2\right] + \left[2(\beta\gamma)\right]$$

$$\pi\gamma^2 = \left[\pi(1_{ct})^2 + \pi(\gamma\beta)^2\right] + \left[\gamma(2\pi\beta)\right]$$

$$vt' \geq ct \leftrightarrow \rho := \left(\frac{vt'}{ct}\right) = \gamma\beta \geq 1$$

$$vt' = ct \leftrightarrow \rho = \frac{ct}{ct} = 1_{ct},\ t' = t,\ v = c$$

$$n(vt') = n(ct) \leftrightarrow n\rho = n(1_{ct})$$

$$(n+1)(vt') = (n+1)(ct) \leftrightarrow (n+1)\rho = (n+1)(1_{ct})$$

$$ct' = ct + \frac{vt'}{ct}(ct) = \gamma\beta(ct) = \rho(ct),\ \rho := \gamma\beta$$

10. Pauli Matrices

$$|\sigma_1| := \begin{vmatrix} 0 & \cos\theta \\ \cos\theta & 0 \end{vmatrix} \quad |\sigma_2| := \begin{vmatrix} 0 & i\sin\theta \\ -i\sin\theta & 0 \end{vmatrix} = \begin{vmatrix} 0 & i\sin\theta \\ i\sin(-\theta) & 0 \end{vmatrix}$$

$$|\sigma_3| := \begin{vmatrix} \cos\theta & 0 \\ 0 & -\cos\theta \end{vmatrix},\ Tr|\sigma_3| = 0,\ \cos\theta = \cos\theta$$

$$|\sigma_3| := \begin{vmatrix} i\sin\theta & 0 \\ 0 & -i\sin\theta \end{vmatrix},\ Tr|\sigma_3| = 0,\ i\sin\theta = -i\sin\theta$$

Initial State $\theta = \frac{\pi}{4}, \frac{3\pi}{4}$

$$|\sigma_1| := \begin{vmatrix} 0 & \cos\left(\frac{\pi}{4}\right) \\ \cos\left(\frac{3\pi}{4}\right) & 0 \end{vmatrix} = \begin{vmatrix} 0 & 0 \\ 0 & 0 \end{vmatrix}$$

$$|\sigma_1|^2 := \begin{vmatrix} \cos^2\left(\frac{\pi}{4}\right) & 0 \\ 0 & \cos^2\left(\frac{3\pi}{4}\right) \end{vmatrix} = \begin{vmatrix} 0 & 0 \\ 0 & 0 \end{vmatrix}$$

$$|\sigma_2| := \begin{vmatrix} 0 & i\sin\frac{\pi}{4} \\ -i\sin\frac{3\pi}{4} & 0 \end{vmatrix} = \begin{vmatrix} 0 & i \\ -i & 0 \end{vmatrix}$$

$$|\sigma_2|^2 = \begin{vmatrix} 0 & i \\ (-i) & 0 \end{vmatrix} = \begin{vmatrix} i^2 & 0 \\ 0 & (-i)^2 \end{vmatrix} = \begin{vmatrix} i^2 & 0 \\ 0 & i^4 \end{vmatrix} = \begin{vmatrix} -1 & 0 \\ 0 & 1 \end{vmatrix}$$

$$Tr|\sigma_2|^2 = 0 = 1 - 1,\ Det|\sigma_2|^2 = (i^2)(i^4) = i^6$$

Final State $\theta = 0, \pi$

$$|\sigma_1| := \begin{vmatrix} 0 & \cos(0) \\ \cos(\pi) & 0 \end{vmatrix} = \begin{vmatrix} 0 & 1 \\ 1 & 0 \end{vmatrix}, \quad |\sigma_2| := \begin{vmatrix} 0 & \sin 0 \\ \sin\frac{3\pi}{4} & 0 \end{vmatrix} = \begin{vmatrix} 0 & 0 \\ 0 & 0 \end{vmatrix}$$

$$|\sigma_1|^2 := \begin{vmatrix} \cos^2(0) & 0^2 \\ 0^2 & \cos^2(\pi) \end{vmatrix} = \begin{vmatrix} 1^2 & 0^2 \\ 0^2 & 1^2 \end{vmatrix}$$

$$Tr|\sigma_1|^2 = 1^2 + 1^2, \; Det|\sigma_1|^2 = 1^2 \times 1^2 = 1^4$$

$$|\sigma_2|^2 := \begin{vmatrix} \sin^2 0 & 0^2 \\ 0^2 & \sin^2\frac{3\pi}{4} \end{vmatrix} = \begin{vmatrix} i^4 0^2 & 0^2 \\ 0^2 & i^4 0^2 \end{vmatrix} = \begin{vmatrix} 0^2 & 0^2 \\ 0^2 & 0^2 \end{vmatrix}$$

$$Tr|\sigma_2|^2 = 0^2 + 0^2, \; Det|\sigma_2|^2 = (0)^2 (0)^2$$

(Since no coordinates exist at impact, the coordinate system is zero.

$$|\sigma_1|^2 + |\sigma_2|^2 := \begin{vmatrix} 1^2 & 0^2 \\ 0^2 & 1^2 \end{vmatrix} + \begin{vmatrix} 0^2 & 0^2 \\ 0^2 & 0^2 \end{vmatrix} = |\sigma_1|^2$$

Existence $(+)$ and Interaction $(\times)$ Operators

(the Interaction Operator is represented by juxtaposition $(1)(1)$ where the context is clear.

$$\# = 1 + 1$$

$$\#^2 = (1+1)^2 = \left[1^2 + 1^2\right] + 2\left[(1)(1)\right]$$

$$= Tr\begin{vmatrix} 1^2 & 0 \\ 0 & 1^2 \end{vmatrix} + Det\begin{vmatrix} 1 & 1 \\ -1 & 1 \end{vmatrix}$$

, where $Det\begin{vmatrix} 1 & 1 \\ -1 & 1 \end{vmatrix} = 1^2 - \left(-1^2\right) = 1^2 + 1^2 = 2\left(1^2\right) = 2\left[(1)(1)\right]$.

This result can be interpreted as the sum of an "existence" term: $\left[1^2+1^2\right]$ with a group operation of addition $(+)$ and a multiplicative $(\times)$ "Interaction" term: $2\left[(1)(1)\right]$; where the latter can also refer to "change in entropy", "entanglement" as opposed to a group with a single operator.

Note that the operation of multiplication (second order) requires the existence (first order) of two elements, so interaction of elements is not a group (which is defined as a single operation between two elements)

Analysis of prime number (invariant) interaction for two elements

In the invariant (prime number) analysis the case

$\# = a+b$ where a and b are elements of a Pythagorean triple $\{a,b,c\}$ The values $\{a,b,c\}$ represent all such triples; the values $\{4,3,5\}$ thus represent all triples with a specific example.

$$\# := 7 = 4+3$$
$$\#^2 = 49 = 7^2 = (4+3)^2 = [4^2+3^2]+[2(3\times 4)] = [16+9]+[24] = [25]+[24]$$

The term $[25] = a^2+b^2$ represents the existence of the interacting terms and the term $[24] = 2ab$

Note that:

$$2(ab) = 4\left(\frac{1}{2}ab\right)$$
$$24 = 2(12) = 2(3\times 4) = 4(\frac{12}{2}) = 4\times 6$$

Bosons

Bosons are represented by invariants (prime numbers)

Fermions

Interpretation of the Stern-Gerlach experiment using invariants

Complex Numbers

$$i := \sqrt{-1}$$
$$\psi := 4 + 3i$$
$$\psi^* := 4 - 3i$$
$$\psi\psi^* = [4+3i][4-3i] = \left[4^2 + 3^2\right] + \left[(3i)4 - 4(3i)\right] = [16+9]$$

$$\psi\psi^* = \left[4^2 + 3^2\right] = \left[4^2 + (3 \cdot i)^2\right] = 4^2 = a^2 + b^2$$

Note that

$$\psi\psi^* = [25] = 4^2 + 3^2$$

So that

$$\#^2 = 49 = 7^2 = [\psi\psi^*] + [2(4 \times 3)] = [\psi\psi^*] + [2ab]$$
$$= [\psi\psi^*] + \left[(a \otimes b) + (-b \otimes a)\right]$$

Note that since $i \perp 1 \leftrightarrow i^2 \perp 1 \leftrightarrow -1 \perp 1$ so that

$$\left(\overset{\leftrightarrow}{\vec{i}} \cdot \overleftrightarrow{\sqrt{1}}\right) = \sqrt{0}$$
$$\left(\vec{i} \otimes \overleftarrow{\sqrt{1}}\right) = \left(\vec{i} \cdot \overleftarrow{\sqrt{1}}\right) = 0$$
$$\overleftarrow{\sqrt{1}} \otimes \vec{i} = -\left(\overleftarrow{i} \cdot \overrightarrow{\sqrt{1}}\right) = 0$$

Then $\#^2 = 0^2 \leftrightarrow \# = 0$

Note that this relation is not equivalent to:

$$4\left(1^2\right) := Tr\begin{vmatrix} 1^2 & 0 & 0 & 0 \\ 0 & 1^2 & 0 & 0 \\ 0 & 0 & 1^2 & 0 \\ 0 & 0 & 0 & 1^2 \end{vmatrix} = \left[1^2 + 1^2 + 1^2 + 1^2\right]$$ which represents the sum of four squared units

without multiplication (interaction)

Complex Numbers

$$\psi := \cos(0) + i\sin(\theta),\ i := \sqrt{-1}$$
$$\psi^* := \cos(0) - i\sin(\theta)$$
$$\psi\psi^* = \left[\cos^2(0) + \sin^2(\theta)\right] + i\sin(\theta)\cos(0) - i\sin(\theta)\cos(0)$$
$$\psi\psi^* = \left[\cos^2(0) + \sin^2(\theta)\right]$$

$$\psi := \left(\sqrt{1}\right) + i$$
$$\psi^* := \left(\sqrt{1}\right) - i$$
$$\psi\psi^* := \left[\left(\sqrt{1}\right) + i\right]\left[\left(\sqrt{1}\right) - i\right] = 1 + i\left(\sqrt{1}\right) - i\left(\sqrt{1}\right) - \left(i^2\right) = 1 + 1 \leftrightarrow i := \sqrt{-1}$$

However,

$i^2 = \left(\sqrt{-1}\right)\left(\sqrt{-1}\right) = \sqrt{(-1)(-1)} = \left(\sqrt{(1)^2}\right) = 1 \neq 1$,since $1 \cdot 1 = 1 \otimes 1 = \left[(1)\cos(0)\right]\left[(1)\sin(0)\right] = 0$,

That is, the $\vec{1}$ and the $\vec{1}$ are orthogonal (and hence affine) in the complex plane; $\vec{1} \perp \vec{1}$

The Lagrangian and the Hamiltonian

The Lagrangian Is defined as the difference between the Kinetic Energy $T(f,v,\tau)$ and the Potential Energy (the energy of position) $V(x,t,v)$ so that

$$L = T(f,v,\tau) - V(x,t,v),\ V(x,t,v) \le T(m,v,\tau)$$

The Hamiltonian is defined as the sum of the Kinetic Energy and the Potential Energy, so that

$$H := T(f,v,\tau) + V(x,t,v)$$

$$\# = \left[\cos(\pi)\vec{i} + \cos(0)\overleftarrow{i}\right] + \left[\sin\frac{\pi}{4}(j\downarrow) + \sin\frac{3\pi}{4}(j\uparrow)\right]$$
$$= 2\left(\vec{i}\cdot\overleftarrow{i}\right) + 2\left(\vec{j}\cdot\overleftarrow{j}\right)$$

$$\#_i := \cos(0) + \sin(\theta), i = 1,2,3,4$$
$$(\#_i)^2 = (\cos(0) + \sin(\theta))^2 = \left[1^2 + \sin^2(\theta)\right] + [2(1)(\sin\theta)]$$
$$[2(1)(\sin\theta)] = \left[4\left(\frac{1}{2}\sin\theta\right)\right]$$

For all four quadrants, the existence term is $\left[1^2 + \sin^2(\theta)\right]$ and the interaction term is $[2(1)(\sin\theta)] = \left[4\left((1)\frac{1}{2}\sin\theta\right)\right]$ with $A = \left(\frac{1}{2}\cos(0)\sin\theta\right)$ as the interaction term for each of the four quadrants. All interactions are positive, since

$$\cos(0) = \cos(\pi)$$
$$|-\sin\theta| = |\sin(-\theta)|$$

In each quadrant, increasing or decreasing values of the interaction (entropy, entanglement, etc.) are determined by the following relations:

$$Q_1 := 0 \le \theta < \frac{\pi}{4}, \sum_0^{\frac{\pi}{4}} A\uparrow_{ccw}, \sum_0^{\frac{\pi}{4}} A\downarrow_{cw}$$

$$Q_2 := \frac{\pi}{4} \leq \theta < \pi, \sum_{\pi}^{\frac{\pi}{4}} A \uparrow_{cw}, \sum_{\pi}^{\frac{\pi}{4}} A \downarrow_{ccw}$$

$$Q_3 := \pi \leq \theta < \frac{3\pi}{4}, \sum_{\pi}^{\frac{3\pi}{4}} A \uparrow_{ccw}, \sum_{\pi}^{\frac{\pi}{4}} A \downarrow_{cw}$$

$$Q_4 := \frac{3\pi}{4} \leq \theta < 2\pi, \sum_{\frac{3\pi}{4}}^{2\pi} A \uparrow_{cw}, \sum_{\pi}^{\frac{\pi}{4}} A \downarrow_{ccw}$$

$$Q_2 := \frac{\pi}{4} \le \theta < \pi, A = \left\{ \frac{1}{2}\cos(0)\sin(\theta) \right\}$$

$$\left\{ \frac{1}{2}\cos(0)\sin(\theta) \right\} \uparrow_{cw}, \left\{ \frac{1}{2}\cos(0)\sin(\theta) \right\} \downarrow_{ccw}$$

$$\left| -\sin\theta \right| = \left| \sin(-\theta) \right|, \frac{\pi}{4} \le \theta \le \pi, -\frac{3\pi}{4} \le \theta < 2\pi$$

$$\frac{f}{2}\overleftrightarrow{i} = \frac{\#}{2r}\overleftrightarrow{i} = \frac{1}{2r}\left[\cos(\pi) + \sin(0) \right]\overleftrightarrow{i}$$

$$\frac{\#}{r} = \frac{(f)}{r}\overleftrightarrow{i} = \left(\frac{1}{r} \right)\left(\frac{f}{2} + \frac{f}{2} \right)\vec{i} = f\frac{\cos(\pi)}{2}\vec{i} + f\frac{\cos(0)}{2}\overleftarrow{i}$$

$$f^2 = m_0 = \left(\frac{f}{2} + \frac{f}{2} \right)^2 = \left(\frac{\#}{r} \right)^2 = \left[\cos(0) + \cos(\pi) + \sin\left(\frac{\pi}{4} \right) + \sin\left(\frac{3\pi}{4} \right) \right]^2 = \left[\cos^2(0) + \sin^2(\theta) \right] + \left[\cos(0) 2\sin(\theta) \right]$$

$$\#^2 = \left[r^2\cos^2(0) + r^2\sin^2(\theta) \right] + \left[r\cos(0) 2r\sin(\theta) \right]$$

$$\pi\#^2 = \left[\pi r^2\cos^2(0) + \pi r^2\sin^2(\theta) \right] + \left[r\cos(0) 2\pi r\sin(\theta) \right]$$

$$\theta = 0, \frac{\pi}{4}$$

$$\pi\#^2 = \pi r^2\cos^2(0) +$$

$$\#^2 = r^2\cos^2(0) \leftrightarrow \# = r$$

$$\theta = \frac{\pi}{4}, \frac{3\pi}{4}$$

$$\pi\#^2 = \left[\pi r^2\cos^2(0) + \pi r^2\sin^2\left(\frac{\pi}{4} \right) \right] + \left[r\cos(0) 2\pi r\sin\left(\frac{\pi}{4} \right) \right]$$

$$= \left[\pi r^2 + \pi r^2 \right] + \left[r\cos(0)\{2\pi r\} \right]$$

$$\{2\pi r\} = 4\left(\frac{1}{2}\pi r \right) = \pi r + \pi r$$

$$\pi\#^2 = \pi r\left[r + r \right] + rcos(0) C_{2\pi r}, C_{2\pi r}, = 2\pi r\sin\left(\frac{\pi}{4} \right)$$

$$i\hbar\frac{d}{dt}\psi(t)=\widehat{H}(t)$$

$$\left[\widehat{H}(t)\right]\left[\widehat{H}(t)\right]^{*}=Det\begin{vmatrix}0 & i\hbar\frac{d}{dt}\psi(t)\\ -i\hbar\frac{d}{dt}\psi(t) & 0\end{vmatrix}=Det\begin{vmatrix}0 & i\hbar\frac{d}{dt}\psi(t)\\ -i\hbar\frac{d}{dt}\psi(t) & 0\end{vmatrix}=$$

$$\hbar\frac{d}{dt}Det\begin{vmatrix}0 & i\psi(t)\\ -i\psi(t) & 0\end{vmatrix}=\hbar\frac{d}{dt}\psi(t)Det\begin{vmatrix}0 & i\\ -i & 0\end{vmatrix}=\hbar\frac{d}{dt}\psi(t)Det\left|\sigma_2\right|=\hbar\frac{d}{dt}\psi(t)Det\begin{vmatrix}0 & i\\ -i & 0\end{vmatrix}=-i^2=1$$

$$\psi=t^2+\delta$$

$$\frac{d\psi}{dt}=2t$$

$$\hbar\frac{d}{dt}\psi(t)=\hbar\frac{d}{dt}t^2=2\hbar t$$

$$\psi(t)=e^{\frac{-iHt}{\hbar}}\psi(0)$$

$$\psi(0)=\left[e^{\frac{-iH0}{\hbar}}\right]\psi(0)=e^0$$

$$\frac{d}{dt}\psi(0)=\frac{d}{dt}\left\{\left[e^{\frac{-iH0}{\hbar}}\right]\psi(0)\right\}=\frac{d}{dt}e^0=0e^0=0,\ t=0$$

$$\psi(t)=\psi(t)\left(\frac{\psi(t)}{\psi(t)}\right)=\psi(t)\left(1_{\psi(t)}\right)$$

$$t=t\left(\frac{t}{t}\right)=t\left(1_t\right)$$

$$\frac{d}{dt}\left(\psi(t)\right)=\psi(t)\left(\frac{\psi(t)}{\psi(t)}\right)=\psi(t)\left(1_{\psi(t)}\right)=0$$

No time change of $\psi(t)$ at $\psi(0)=\psi(0)\left(\frac{\psi(0)}{\psi(0)}\right)=\psi(0)\left(1_{\psi(0)}\right),\ t=0$

$$\psi(t)=\psi(t)\left(\frac{\psi(t)}{\psi(t)}\right)=\psi(t)\left(1_{\psi(t)}\right)$$

$$f:=v\tau=\frac{f}{2}+\frac{f}{2}$$

$$m_f:=(f)^2=\left(\frac{f}{2}+\frac{f}{2}\right)^2=\left[\left(\frac{f}{2}\right)^2+\left(\frac{f}{2}\right)\right]^2+2\left[\left(\frac{f}{2}\right)\left(\frac{f}{2}\right)\right]$$

Coordinate representation

$$V(x,t,v):=x=vt$$

Both x and (vt) are prime numbers for $x+0=x,\ x-x=0,\ x>0$

$$x=x\left(\frac{x}{x}\right)=x\left(1_x\right)=vt=(vt)\left(\frac{(vt)}{(vt)}\right)=(vt)\left(1_{(vt)}\right)$$

$$v=\frac{x}{t}=v\left(\frac{t}{t}\right)=v\left(1_t\right)$$

Note that v is a ratio of prime numbers,

$$x:=C_r=2\pi r\leftrightarrow r=\frac{x}{2\pi}=\frac{C_r}{2\pi}$$

$$r+0=r \leftrightarrow \frac{r}{r} := 1_r > 0$$

$$r = r\left(\frac{r}{r}\right) = r\left(1_r\right)$$

$$1_r\left(\frac{1_r}{\left(1_r\right)}\right) = \left(\frac{1}{r}\right)\left(\frac{1_r}{\left(1_r\right)}\right) = \frac{1}{r}\left(\frac{r^2}{r^2}\right) = \frac{r}{r^2} = \frac{1}{r}$$

$\frac{1}{r}$ is a prime number (invariant)

$$f\left(\frac{1}{r}\right) = \frac{1}{r} = \frac{1}{2}\left(\frac{1}{r}\right) + \frac{1}{2}\left(\frac{1}{r}\right)$$

$$\left[f\left(\frac{1}{r}\right)\right]^2 = \left(\frac{1}{r^2}\right) = \left[\frac{1}{2}\left(\frac{1}{r}\right) + \frac{1}{2}\left(\frac{1}{r}\right)\right]^2 = \frac{1}{4}\left[\left(\frac{1}{r^2}\right) + \left(\frac{1}{r^2}\right)\right] + \left[2\left(\frac{1}{2r}\right)\left(\frac{1}{2r}\right)\right]$$

$$= \frac{1}{2}\left[\left(\frac{1}{r^2}\right)\right] + \left[\frac{2}{4}\left(\frac{1}{r^2}\right)\right] = \frac{1}{2}\left[\left(\frac{1}{r^2}\right)\right]_{(+)} + \frac{1}{2}\left[\left(\frac{1}{r^2}\right)\right]_{(\times)}$$

, where $\frac{1}{2}\left[\left(\frac{1}{r^2}\right)\right]_{(+)}$ represents the existence of the coordinate system and $\frac{1}{2}\left[\left(\frac{1}{r^2}\right)\right]_{(\times)}$ represents its equal and opposite interaction.

This system is represented by the relation:

$$\left[f\left(\frac{1}{r}\right)\right]^2 = Tr\begin{vmatrix} \left(\frac{1}{r^2}\right) & 0 \\ 0 & \left(\frac{1}{r^2}\right) \end{vmatrix} + Det\begin{vmatrix} \left(\frac{1}{r}\right) & \left(\frac{1}{r}\right) \\ -\left(\frac{1}{r}\right) & \left(\frac{1}{r}\right) \end{vmatrix} = \left[\left(\frac{1}{r^2}\right) + \left(\frac{1}{r^2}\right)\right] + \left[2\left(\frac{1}{r}\right)\left(\frac{1}{r}\right)\right]$$

$$= \left[\left(\frac{1}{r^2}\right) + \left(\frac{1}{r^2}\right)\right]_{(+)} + \left[2\left(\frac{1}{r}\right)\left(\frac{1}{r}\right)\right]_{(\times)} = 2\left[\left(\frac{1}{r^2}\right)\right]_{(+)} + 2\left[\left(\frac{1}{r^2}\right)\right]_{(\times)}$$

Note that this relation is not logically equivalent to:

$$4\left(\frac{1}{r^2}\right) = Tr\begin{vmatrix} \frac{1}{r^2} & 0 & 0 & 0 \\ 0 & \frac{1}{r^2} & 0 & 0 \\ 0 & 0 & \frac{1}{r^2} & 0 \\ 0 & 0 & 0 & \frac{1}{r^2} \end{vmatrix} = \frac{1}{r^2}+\frac{1}{r^2}+\frac{1}{r^2}+\frac{1}{r^2}$$ which represents the existence four separate inverse squared radii bur not interactions.

Note that $r = 1 \neq r^2 = 1^2$ (Russell's Paradox)

$$f := v\tau = \frac{f}{2}+\frac{f}{2}$$

$$m_f := (f)^2 = \left(\frac{f}{2}+\frac{f}{2}\right)^2 = \left[\left(\frac{f}{2}\right)^2+\left(\frac{f}{2}\right)\right]^2 + 2\left[\left(\frac{f}{2}\right)\left(\frac{f}{2}\right)\right]$$

$$2m_f := 2(f)^2 = (m_f + m_f)$$

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$$m_{\#} := m_f + m_f,\ m_f \leq m_f \leftrightarrow (m_f - m_f) := (\delta m_{\#}) \geq 0$$

$$(m_{\#})^2 := (m_f + m_f)^2 = \left[(m_f)^2 + (m_f)^2\right] + 2\left[(m_f)(m_f)\right]$$

$$(m_f) := 2G(m_f),\ G << 1$$

$$(m_{\#})^2 := (m_f + m_f)^2 = \left[(m_f)^2 + (m_f)^2\right] + 2G\left[(m_f)(m_f)\right]$$

Newton's Gravitational Law as the interaction between two existing masses:

$$(m_g)_{(r)} := 2G\frac{\left[(m_f)(m_f)\right]}{(r)^2} := h^h = 2S^2,\ S = \sqrt{G\frac{\left[(m_f)(m_f)\right]}{(r)^2}}$$

$$x = vt, v := \frac{x}{t} = v\left(\frac{t}{t}\right) = v(1_t)$$

$$H = T(m, v, \tau) + V(x, t, v)$$

$$it = it\langle \sim\equiv \rangle i(\tau),\ i := \sqrt{-1}$$